Before the
FEDERAL COMMUNICATIONS COMMISSIONS
Washington, D.C. 20554

In the Matter of

Advanced Television Systems and Their Impact on the Existing Television Broadcast Service	)	MM Docket No. 87-268 RM - 5811
Review of Technical and Operational Requirements Part 73-E. Television Broadcast Station	)	
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	)	

COMMENTS OF ZENITH ELECTRONICS CORPORATION

These comments are submitted by Zenith Electronics Corporation (Zenith) in response to the Notice of Inquiry released August 20, 1987. Zenith is a major manufacturer and marketer of television receivers, VCRs, and satellite TV receiving systems. In addition, Zenith is a major manufacturer and supplier of encoding and decoding equipment to cable operators throughout the United States. Accordingly, the subject of Advanced Television Systems (ATV) and High Definition Television (HDTV) systems is of great importance to Zenith.

GENERAL COMMENTS

Thirty years ago, when the NTSC standards were

promulgated, there was only broadcast television. Alternative TV program distribution systems (cable, satellite, and VCRs) had not been born. Accordingly, spectrum and interference related issues were of universal applicability and primary importance.

Today, cable TV, video cassette recorders, and satellite TV receiving systems all compete with broadcast television for available viewing time. Cable TV distribution systems, which are now available to more than 50% of American TV households, use closed circuit signal distribution in a technically protected environment which is not frequency band limited and where the interference phenomena leading to the UHF taboos governing broadcast television can be overcome by simply translating programs to midband, superband and ultraband cable channels outside the broadcast TV spectrum and controlling signal levels. There are plenty of extra channels available in a cable TV system, so that conservation of spectrum space is immaterial. VCRs also require no spectrum space and enjoy virtually complete interference immunity.

Consequently, there are major variances in perspective among the different classes of program distribution systems. Even such basic issues as spectrum availability and interference immunity, which are of major concern with respect to terrestrial TV broadcasting are of little or no concern to cable or satellite system operators.

It is of utmost importance that any ATV or HDTV standards for terrestrial broadcasting be derived only after thorough and objective evaluation and testing of all state-of-the-art technology and the available technical alternatives, and also that such standards be flexible enough to accommodate improvements generated by advancing technology in the future. The Commission and broadcasters may have concern that patience will allow some other service or system from some other country to preempt the standards decision here, either by "dictating" ultimate systems (which may not be the "best" choice) or by economically disadvantaging existing broadcast services.

But it is more important that the technical, business and public interest attributes of an ATV system for broadcast be well conceived than that it be first.

THE COMMISSION SHOULD NOT BE STAMPEDED INTO ADOPTING ANY PARTICULAR TIMETABLE OR SELF-IMPOSED DEADLINE. PATIENCE, NOT URGENCY, SHOULD BE THE WATCHWORD.

SPECIFIC COMMENTS

Zenith further presents the following specific comments in response to those inquiries as to which Zenith has relevant information or an informed opinion.

> "38. The above list [specified in paragraphs 27-37] is partial and incomplete. In order to develop the record on the present state of technologies on advanced television, we request comments on the merits of the systems/proposals mentioned above, and solicit further information on all possible proposals or new technologies that would explore the full potential of an advanced TV service, or would strike a reasonable

balance between improved performance and cost, especially opportunity cost."

Zenith does not have sufficient information or hands-on experience with respect to the enumerated systems to comment meaningfully on the merits of these various proposals. However, the fact that there are such a large number of alternative proposals with significant differences in spectrum requirements, compatibility, and performance limitations, and that there are incomplete performance specifications and test data for each, underlines the need for patience and thoroughness in arriving at policy decisions concerning ATV or HDTV terrestrial broadcasting standards. Any decision favoring one system over another at this early stage would be clearly premature and unwise.

"40-1. What criteria, such as video/audio quality performance, transmission bandwidth, NTSC compatibility, etc. should the Commission use to evaluate and compare the various ATV technologies? What are the appropriate trade-offs between the various criteria?"

In addition to the considerations identified by the Commission in the notice (e.g., spectrum availability, compatibility, interference potential), the Commission should be concerned with general access by industry members to the supporting technology, and with availability of needed patent licenses, if any, on a royalty-free or reasonable royalty basis. Further, the Commission and industry members should be assured that special components developed for use in any approved system will be readily available to all equipment manufacturers.

Most importantly, the Commission must weigh the impact of each of the systems on other program distribution systems, namely cable TV, satellite TV, and VCRs. Zenith believes that it should be possible to develop an advanced TV system for terrestrial broadcasting which is compatible with both existing NTSC standards and with the technologies and business interests of the competing program distribution interests. The Commission's primary objective should be to arrive at standards which achieve ATV objectives for terrestrial broadcasting without disadvantaging cable, satellite, or VCR program distribution.

> "40-2. What changes in ATV technologies should be anticipated for the near future? For example, can ATV technologies be expected to develop so that the transmission bandwidth of a high resolution production source can be compressed to fit within 6 MHz channel without apparent loss of quality? At what stage is the development of an all-digital ATV system using digital signal processing and IC technologies."

We cannot be certain, but history and experience suggest that with time and improving technology, some way will be found to compress HDTV to fit within a 6 MHz channel with fully acceptable picture quality and probably even without apparent loss of quality. Putting compatible color on the same 6 MHz band previously occupied by monochrome TV seemed an impossible task at the outset*, but this was nevertheless achieved and later enhanced with NTSC standards.

*Indeed, a false start was made with incompatible CBS system standards, with an overall negative business impact which

could not be overcome by even such a significant improvement as the addition of color.

Semiconductor technology has now advanced from discrete transistors to more and more complex integrated circuits, and the industry has arrived at the point that active devices are available in virtually limitless numbers on VLSI integrated circuit chips. This makes feasible the use of complex electronic circuitry beyond the wildest dreams of five or ten years ago. And the speed of technology advance has also accelerated.

Most, if not all, of the potential ATV systems require or will benefit from digital signal processing for e.g., sampling, computation, memory functions. Practical implementations will require large scale, probably custom, integration. Transmission methodologies and spectrum are, however, the primary focus of this inquiry. We know of no proposals or present prospects for transmission in digital form where, absent powerful data reduction methods, the bandwidth requirements are excessive.

> "40-3. How quickly are developments of the various ATV technologies progressing? Which are now operational? Which are in the prototype stage? Developmental stage? How long until these systems are realized?"

> "40-4. What are the relative costs of these new transmission systems for programming producers? For broadcasters? For consumers?"

These questions can best be answered by the proponents of the various systems. However, it is not realistic to expect meaningful cost or time estimates at such an early

stage. All of the systems, with the possible exception of the NHK system, would have to undergo production engineering before meaningful cost estimates of consumer equipment could be derived.

The cable TV industry has become increasingly participative within the past year, and this is accelerating industry development of ATV and HDTV systems. The Commission should not be concerned that the patience advocated by Zenith will result in undue delay in arriving at an acceptable industry standard.

> "40-5. From a technical perspective, what are the advantages and disadvantages of augmenting the channel capacity of existing television assignments? What is the appropriate bandwidth for the augmentation channel? Must it be contiguous to the main channel?"

Augmentation channel issues are very system dependent, and each proponent should be called upon to respond with respect to its proposed system. In general, it may be observed that if the augmentation channel is not contiguous to the main channel, a separate tuner/IF channel/decoder will be required and this will represent a significant extra cost to consumers. In addition, the use of a non-contiguous augmentation channel can be expected to accentuate multi-path distortion and other transmission differences and thereby degrade picture quality.

> "42. There are three general factors which we believe should be considered in analyzing the spectrum allocation questions. We must first establish whether advanced broadcast television systems should be separate from, or somehow consolidated with, the existing television broadcast service."

This choice is a matter of little or no moment to the cable, satellite TV, and VCR industries. If ATV is promulgated as a separate service, presumably new spectum allocations would be required and this would be disadvantageous to the terrestrial broadasting interest and be more costly to consumers by requiring the purchase of more expensive or additional receiving equipment.

> "42... We also must consider the technical planning factors (receiving system performance, coverage areas, etc.) that should be developed for advanced television systems...."

Overall system performance should provide a signal-to-noise ratio in the ATV display at least as good as existing TV broadcast services, without reduction in coverage areas at least within Grade A zones. Broadcasters must speak to their coverage area objectives, but it is reasonable to believe that reduced coverage would be a deterrent to early participation on the part of broadcasters and to market penetration of new receivers.

> "42... Third, we need to consider a variety of possible bands in the radio frequency spectrum which could accommodate additional capacity requirements of advanced television systems..."

Zenith prefers use of the present TV broadcast bands; not only to avoid disrupting the competitive relationships among the various program distribution industries, but also to accelerate the development and acceptance of ATV by use of the highly refined VHF and UHF TV broadcasting and receiving equipment technology.

"42... As a final matter, because it offers the

> prospect of additional spectrum capacity which could be used for ATV, we also consider in this section the possibility of relaxing or eliminating UHF channel assignment taboos."

None of the taboos should be relaxed absent a clear showing that the UHF service will not be degraded. As discussed in the NOI and hereinafter, that criterion appears to be met with respect to the oscillator taboo.

> "43. The institution of advanced television systems could be provided in one of three ways: 1) as a new service separate and distinct from the existing television broadcast services; 2) as a service that augments wherever feasible existing NTSC service or, 3) as a service integrated fully with the existing television broadcast service which over time would replace entirely the NTSC service. To the extent that such an approach is both technically feasible and economically efficient, we now incline towards the view that, in the event we establish improved broadcast television systems, they should be implemented in a manner that allows eventually for the complete replacement of the NTSC, so that the benefits of improved off-air television service may be enjoyed by the Nation's viewers generally. However, we solicit comments on all three alternative approaches."

Resolving this issue at this time would be premature in that it would eliminate some system proposals (e.g., NAP) on the basis of expediency rather than technical merit. Earlier in these comments, Zenith took the position that patience rather than urgency should govern the course of these proceedings. Zenith feels that all system proposals are entitled to full and fair evaluation since it is unlikely that any single system will provide ideal answers to all of the issues presented.

> "50-9. What would be the technical and economic impact on existing NTSC service if the Commission modified or eliminated the existing protection criteria?"

It still appears that relaxation or elimination of interference protection criteria (other than the local oscillator taboo) would degrade existing UHF NTSC service and existing NTSC receiver performance compared both to present service and to VHF.

As discussed below, additional insight may be obtained by evaluating performance data on the current receiver population against the actual U/D signal ratios which are encountered under the present taboos.

> "53-10. Should the Commission accommodate ATV in non-broadcast spectrum allocations? If so, in what portion of the spectum and how much?"

A response to this question is obviously related to the compatibility and transitional service issues. Because of such considerations, and because of the additional problems, both known and unknown, which may be encountered in operating in other portions of the spectrum, Zenith advocates neither expanding nor contracting the TV broadcast spectrum to accommodate HDTV, except for reserving unassigned portions of the UHF TV spectrum for HDTV and not assigning them to land mobile or other non-TV service. Terrestrial microwave experience has been in point-to-point, not broadcast service where we believe there are many unknowns.

ADVANCED TV AND THE UHF TABOOS

At paragraphs 78 and 79, the NOI presents several questions concerning possible needs or opportunities for revision of the UHF taboos.

Double Conversion

Ten years have passed since the completion of the FCC/TI prototype of an "advanced" receiver using double conversion; several years before that Zenith initiated research for the first of several times on a related approach.

To our knowledge such a configuration has not been commercialized for broadcast television receivers in any of the world's markets. Some of the reasons, in no particular order, are:

- o degradation of VHF performance;
- o concern about achievement and control of UHF noise performance;
- o cost;
- o incompatibility of the proposed first IF with the commercial requirements to tune CATV channels and the technology limitations of a still higher IF choice;
- o the expectation that performance of conventional designs could be improved over time.

Conventional NTSC Receiver with 45 MHz IF

Some improvements have been made, as discussed in the NPRM, the Davis report, and elsewhere here. Development continues on devices and implementations which may offer additional improvements. History tells us they come slowly, may only affect a portion of the band to be tuned

or (for reasons of control or statistics) only a portion of the tuners/receivers, and may effect other parameters in ways which require compromise. We are not able to forecast improvement as a function of time.

> "78-21. Should the Commission take action now to encourage reduced generation of and susceptibility to taboos, either on channels used for NTSC or auxiliary advanced TV signals? If so, what action is appropriate, e.g., spectrum allocation, interference criteria, or other?"

For NTSC receivers, the clear first step is to fully understand the present and growing receiver population and take advantage of the opportunities which may be presented. The question of "encouragement" by whatever means, is a continuing general spectrum issue: what can be reasonably and reliably expected, when, and at what cost? The answer can hardly contribute to the present ATV proceeding - lead time for development, product design and introduction, and the time to achieve major market penetration of any new design argues that ATV spectrum decisions will be controlled by present technology and receivers.

It would be premature for the Commission to take a position encouraging specific spectrum use by, or taboo protection for, an unknown future ATV system.

UHF TABOOS AND THE VHF REFERENCE CONCEPT

The NOI requests comment on OET Technical Memorandum FCC/OET TM-1, A Study of UHF Television Receiver Interference Immunities, prepared by Hector Davis. In this report and in the NOI a new concept for evaluating the need

for UHF taboos is proposed: compare UHF measured immunity for the various taboo interferences with the known-acceptable VHF immunity of receivers to intermodulation resulting from VHF assignments at n+2/n+4 and n-2/n-4 for which there is no taboo. This concept is discussed in the paragraphs which follow.

A. Interference-free Operation at VHF - Criteria for Evaluation of UHF

The fact of interference-free operation of receivers at VHF with VHF allocations is conclusive evidence that the vast majority of all receivers operate satisfactorily in the VHF environment, not just those receivers equivalent to or better than the median receiver. Comparisons against taboos should be based no higher than the first (lowest) decile of both VHF and UHF data; that is, at least 90% of the present receiver population should remain protected from interference due to TV allocations. The need to base evaluation on the broader population, not just the median receiver, is reinforced by examination of the data: the spreads and standard deviations of the UHF data are considerably larger than for the (lower frequency) VHF reference data. Reliance on the median only would surely result in degradation of the UHF service compared to VHF.

B. The VHF Allocation Reference

As pointed out in the Davis report, the VHF allocation environment has other (non-taboo) constraints which facilitate interference-free operation. For example, a

major reason n+2/n-4 and n-2/n-4 VHF channel assignments operate without undue interference is obviously that the receiver input signal conditions for intermodulation interference seldom exist. The general VHF practice of at least approximating colocation of transmiters in metropolitan areas, together with the tendency for similar effective radiated powers, results in field strength ratios which approach 0dB U/D.

Those VHF stations, n, assigned adjacent to metropolitan areas having n-2, n, n+2, n+4... allocations will typically be at cochannel spacing (190 miles) to the potential intermodulation sources. Neither the NOI nor the Davis report give any insight into the incidence of VHF allocations where the sources necessary for intermodulation interference approximate UHF taboo distances from the desired channel (20-75 miles).

Another factor which statistically reduces the potential incidence of the intermodulation interference used as the VHF reference is that two interferors are required. Most of the UHF taboos relate to only a single interferor.

UHF conclusions which may be drawn from the VHF receiver reference concept must recognize the allocation "reference" as well. Colocation with equal power is one possible new allocation and can be approximated by a 0dB U/D curve superimposed on the Davis curves.

C. Susceptibility Plots at Lower Decile of Receivers

Appendix A provides plots of the lower decile of the

data in FCC/OET TM-1 for the various interference conditions. In calculating deciles, all data greater than 0dBm (value not determined due to equipment limitations) are assumed to be 0dBm and included in the computation. An overlay reference corresponding to 0dB U/D is shown to approximate the nominal field strength conditions corresponding to colocation and equal power. This has significance especially for the n±2, n±4 evaluation because it tends to describe the VHF reference colocation which facilitates VHF allocations on alternate channels.

D. Interpretation of the VHF Reference Data and Susceptibility Plots

The Davis data and the curves of his report and Appendix A, taken alone, show nothing about the performance margins of TV receivers relative to the present UHF allocations and taboos.

- The "VHF reference" data compared to the nominal colocation 0dB U/D line shows the margin in VHF alternate channel allocations to accommodate variations in allocation e.g. antenna height, power and site departures from the ideal.
- Specific UHF interference data compared to the "VHF reference" intermodulation data gives an indication of UHF performance for that parameter in an environment like the VHF reference environment which requires two interferors and tends to be dominated by colocation. Lower decile curves of the Appendix

show UHF worse than the VHF reference (typically 5 - 10 db) for all the controlling interferences, n-1, n+2/n+4, n+4, n+7, n+8, n+14, n+15.

- The relationship between the VHF reference curve and the relative U/D field strengths on which the taboo separations are based is unknown. Certainly the field strength U/D ratios are different for the various taboo mileage separations and the VHF reference curve does not represent any of them. Therefore the Davis curves and the modified curves of our Appendix are not a good indication about the potential to modify taboos.

It is necessary to overlay on this susceptibility data the range of predicted (or "allowed") U/D ratios or signal combinations which can be presented to receivers under the present taboo allocations. Only then can the taboo margin of present receivers be estimated. We assume the Commission has data and/or computer programs which will permit this to be done.

E. Oscillator Taboo

As discussed in the NOI, the Davis report, and in other proceedings, the current receiver population has much reduced levels of local oscillator emission compared to receivers on which the taboos were based. While oscillator leakage is no longer a constraint, n±7 allocations must still contend with IF beat interference. For reference, at

n+8 the present IF beat mileage is 20 miles, compared to 60 miles at n+7 for oscillator.

F. Significance of Differences in Interference Mechanisms

The Davis report compares interference susceptibility for the several UHF taboos with the specific VHF intermodulation interference n+2/n+4. In evaluating margin of protection, translating the interference threshold measurements to permissible distance or field strength changes etc. it is necessary to consider the nature of the interference mechanism. Interference to television reception can be categorized as linear and non-linear. Linear interferences are directly proportional to signal strength and selectivity; examples are picture and sound image, lower adjacent channel interference from sound and color subcarriers. Non-linear interference is caused by interaction of several spectral components or by exponential/harmonic functions of one component; examples are cross modulation, intermodulation, half-IF and IF beats, upper adjacent channel. Depending on the specific mechanism and on the component whose amplitude is changed, non-linear interference can change faster than dB per dB of signal level change.

The significance of this can be illustrated with n+1 adjacent channel interference, typically first visible as an intermodulation beat between n+1 picture and n+1 sound carriers. The beat falls at 1.5 MHz in the desired channel, modulated with n+1 sound.

o The interference amplitude is proportional to the square of the instantaneous n+1 picture carrier level and varies linearly with sound carrier - that is, changes 3dB for each dB of n+1 signal level. This must be taken into account in assessing margin or proposing a TV-to-TV allocation change.

o The interference can be eliminated by removing the n+1 sound carrier as long as n+1 picture carrier stays below the threshold of other (crossmodulation) mechanisms. Thus it is evident that TV taboo data cannot be directly used in evaluating the ability of a UHF TV channel to coexist with some different service, e.g. ATV enhancement information. An understanding of both the nature of the new service and of dominant TV interference mechanisms may permit allocations which do not necessarily increase interference to other UHF channels.

ADVANCED TELEVISION COMPATIBILITY ISSUES

The transitional issues addressed in paragraphs 83 - 88 involve primarily economic considerations which should properly be left to competitive forces operating in a free marketplace. The marketplace is already providing several interfaces through which ATV systems can be coupled with current TV receivers and by means of which some ATV hardware can itself be partitioned. (RGB, Y/C, EIA multiport).

Zenith and other equipment makers will manufacture and market any ATV product for which there is a significant marketplace demand. Whether that product is a single-

standard product or a multi-standard product, or whether it is a converter/ decoder or an ATV receiver which is compatible with present NTSC transmission, is immaterial. Government should neither mandate nor encourage the marketplace to lean in any particular direction.

The NOI asks at Paragraphs 89ff about relaxation or elimination of NTSC technical standards. This question has been asked in other proceedings with regard to reducing administrative burdens and enabling compatible ancillary services; it arises here in regard to enabling compatible improvements to television quality. Zenith has few reservations about the need for Rules reciting the technical standards to control NTSC broadcast quality, though some interoperability clauses can be argued. However, so long as NTSC service is continued, we register our concern about permitting the uncontrolled addition of signals to the broadcast NTSC signal for ATV or any purpose without a formal showing that reception on present receivers will not be impaired.

The transition issues raised in Paragraph 94 encompass some of the strongest arguments for transmission compatibility of ATV and NTSC. Absent such compatibility a plan and time schedule will be necessary to assure continued NTSC service to existing receivers during a definitive phaseout period.

Finally, the Commission asks for comments with respect to the prospect of giving licensees greater discretion in

reaching private agreements to compromise UHF taboo restrictions and NTSC protections. Zenith feels strongly that private agreements of this sort should not prevail without public participation. Merely because broadcasters are willing to accept more interference does not mean that it is in the public interest to let them do so. The public must be given an opportunity to be heard, as for example through proceedings such as the present FCC notice of inquiry. The proponents of any such agreements should be required to establish that the proposal is in the public interest.

CONCLUSION

Advanced television is in its infancy. Care must be taken not to overregulate the development of a new technology.

Care must also be taken not to overlook the impact of new regulations on competing business interests, e.g., the satellite TV, cable TV and VCR industries. In Zenith's view, it would be more logical to establish permissible limits of the impact of ATV or HDTV standards on these other businesses or industries, and then and only then to evaluate the various systems which can be advanced to meet those criteria. Equipment manufacturers may be counted upon to supply whatever products may be needed to meet any substantial marketplace demands.

Broadcasters may be expected to advocate design or system criteria or standards which could disadvantage competing business interests such as the cable and satellite TV industries. Conversely the cable and satellite TV industries may be expected to advocate criteria or standards which would preserve or enhance their advantages with respect to the broadcast interests or with respect to each other. However the public interest can only be best served by resolving public policy issues first and allowing these decisions to shape the direction of technological development and product introduction.

Since these policy issues have not been resolved, Zenith submits that many of the detailed questions with respect to which the Commission seeks comments at this time are premature. In any event, any comparative or individual evaluation of presently conceived but undeveloped systems with respect to performance or cost must be imprecise and is therefore premature. Inordinate haste in arriving at ATV system criteria could inhibit, delay or even foreclose the development of the best system attainable at the present state of the art. Evolution of the NHK (MUSE) system and the potential introduction of MUSE ATV products abroad has stimulated others throughout the television industry to speed up their efforts toward the realization of an optimum

ATV system, and the evolutionary processes should be given time to mature and come to full fruition.

Respectfully submitted,

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APPENDIX A

The curves of this Appendix present the interference susceptibility data of FCC OET TM-1 expressed in terms of the lowest decile of the TV receivers studied. As discussed in the accompanying Comments, it would be necessary to protect the large majority of current receivers (at least 90%) in any UHF reallocation if interference-free service comparable to VHF is to be achieved. It is necessary to develop an overlay of U/D ratios or field strengths under the UHF taboos before the data or these graphs can be used to evaluate interference margins against the present taboo allocations.

Fig. 1 This figure shows the VHF data at the lower decile.

Figs. 2-3 VHF reference intermodulation data does not represent the existing UHF field strengths for adjacent channel allocations that one would need to know to draw conclusions about UHF interference margins. There is nothing in the Davis report to substantiate the supposition at 76 of the NOI that n+1 UHF separations can be relaxed.

Figs. 4-9 Both VHF reference and UHF data of Figure 5 represent n+2/n+4 and can be compared in terms of allocation: UHF performance would have 5-10 dB less margin than VHF for this intermodulation product in similar every-other-channel allocation plans. To draw conclusions about

the absolute performance or margin of these UHF receivers in the present UHF taboo one must superimpose U/D ratios which occur under the taboos allocation plan. In a colocation scheme performance would be marginal, poorer than VHF, degrading in stronger signal areas (where the interference would not be noticeable) and as the U/D ratio departs from 0dB due to radiated power differences, etc.

The asymetry of Figures 4 and 5 and of Figures 6 and 7 plus the strong similarity of Figures 5 and 7 show that half IF (n+4), not intermodulation, is the dominant mechanism limiting an every-other-channel UHF allocation plan. The n+4 interference mechanism is more dominant at UHF than at VHF because achievable selectivity is lower at high frequencies.

Figs. 10-13 The assymmetry is believed due to the inherent asymmetry of tuned circuit selectivity, viewed on an absolute frequency scale. The n+7 and n+8 data control, since for every n-7 or n-8 the reciprocal n+7 or n+8 is also present.

Figs. 14-15 All the plots, including these, are in terms of picture carrier. Greater signal levels can be tolerated on the sound image channel, n+14, because the sound carrier is at lower amplitude than the picture carrier and because the interference is a less-visible high frequency beat. This difference is already recognized in the image taboos.

Figs. 10-15 In all these cases, comparison to the VHF data provides no information about UHF field strengths or margins

under the taboo allocations. In addition the data presented in the Davis report and used here is for desired UHF channels between Chs. 30 and 40. At the high end of the UHF band, desired channels above say Ch. 50, the selectivity is reduced and rejection of these linear interferences is poorer than shown. Information currently available indicates the difference can be at least 5dB.